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LLOYD P.C.W. LEE, P.E.
Engineering Division

DAVID WISSMAR, P.E.
Solid Waste Division

BRIAN HASHIRO, P.E.
Highways Division

1995 APR 18 P 3:1

ENVIR. APPEALS BOARD

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

CERTIFIED MAIL Z 031 744 222
RETURN RECEIPT REQUESTED

April 13, 1995

U.S. Environmental Protection Agency
401 M Street S.W
Mail Code 1103B
Washington D.C. 20460

Attention: Environmental Appeals Board

To Whom It May Concern:

SUBJECT: **MAUI COUNTY, DEPT OF PUBLIC WORKS UIC CLASS V PERMIT**
LAHAINA WASTEWATER RECLAMATION FACILITY
PERMIT NO. HI595001

The County of Maui wishes to petition the Environmental Appeals Board to review the following conditions of the final decisions for the subject permit. This appeal is made in accordance with 40 CFR Sections 124.15 to 124.20.

The County of Maui requested to drill back-up injection wells as a part of the subject UIC permit application. The request for back-up wells was made to comply with the Hawaii Administrative Rules 11-62-25, that requires 100% back-up capacity for subsurface disposal systems. The request for the back-up wells was denied by EPA. The denial puts the County of Maui in violation of Hawaii Revised Statues.

The conditions requested for review were discussed during the draft permit process and are recorded in the Final Responsiveness Summary for Public Comment Period on EPA UIC Draft Permit No. HI595001. The County of Maui requests that the following conditions be reviewed:

1. **Part II Page 6 of 19:**

   3(a) tap prior to the gravity flow system and the wellhead for the purpose of obtaining representative samples of the injection fluids.

STATEMENT OF REASONS SUPPORTING REVIEW:

This condition was discussed in Comment No. 34. Region IX personnel agreed in their response that the County of Maui's recommended sample point, the effluent distribution box, is approved and would be reflected in the final permit.

OK misunderstanding distribution system vs. gravity flow sys

2. **Part II Page 6 of 19**

   3(c) four additional monitoring wells to satisfy injected fluid monitoring program requirements. The permittee shall submit a construction workplan with details, locations and depths of the wells to the EPA within one-hundred and twenty (120) days of the effective date of this permit; the permittee shall construct the four monitoring wells within one (1) year of the effective date of this permit; and the permittee shall provide all records of logging, details, locations and other subsequent test data, to the EPA within sixty (60) days of completion of construction. The workplan should be developed with input from the West Maui Advisory Committee.

STATEMENT OF REASONS SUPPORTING REVIEW:

The County of Maui requests that the requirement for this condition be reviewed and rescinded from the permit.

This request is based on the fact that the region has not demonstrated that the existing effluent injection wells are impacting the near shore waters or claimed USDWs. With the County of Maui's limited funding resources, it is not prudent for the County to fund speculative activities. Also, the condition requires additional sampling and monitoring that will impact the abilities of the Wastewater Reclamation Division's Central Laboratory. The County of Maui suggests that this condition, if warranted, be funded and carried out as an activity of the West Maui Watershed Program.

This condition was discussed in Comment No. 14. Region IX personnel indicated in their response that this condition will not be dropped from the final permit, and any unresolved issues will be addressed at the public information workshop.

Region IX personnel also indicated that the construction of four additional monitoring wells (locations and depths to be determined) has been placed in the permit with the sole purpose to delineate the extent of the injected wastewater plume and its effects on the USDWs.....

In Comment No. 17 Region IX personnel acknowledges that the UIC program protects USDWs and cannot address ecological consequences, such as algal blooms, unless a hydrological nexus is established.

It is the County of Maui's belief that the region has not established the necessity for the monitoring wells. The issue of monitoring wells was discussed at the onset as a method to trace the directional flow of the effluent. It was agreed by the scientific community (University of Hawaii), EPA, DOH, and the County of Maui that a dye study would be the most appropriate method to determine the fate of the effluent.

The approach of using monitoring wells was discussed and it was concluded that the challenge of properly locating monitoring wells would be like looking for a "needle in a haystack." This method was, therefore, removed from consideration.

A study titled, "Effluent Fate Study Lahaina Wastewater Reclamation Facility Maui, Hawaii," was performed by Tetra Tech, Inc. The results from the study concluded that effluent was not entering the ocean in the near shore waters as was suspected (See Exhibit A). The study monitoring period lasted for 100 days with dye being injected into the most permeable effluent injection well (Well No. 2). Based on the results of the study it can be deduced that the effluent is not rising to the surface of the ground water table and discharging at the shoreline. These results are also supported by Department of Health monitoring of the near shore waters where nutrient levels were not found to be elevated fronting the facility.

The issue of USDWs is not applicable to this area. Drinking water for West Maui is obtained from surface water retrieved from the West Maui mountains. There are no drinking water wells in the vicinity of the wastewater facility. The direction of the County Water Department further supports the contention that potable water is not available in the area. The Water Department has committed to using surface water as the potable water source for West Maui and is constructing two water treatment facilities to treat surface water for potable use.

dlf USDW

A study performed by Dr. Frank Peterson of the University of Hawaii evaluated the geologic and hydrologic conditions at the Lahaina WWRF prior to the construction of the effluent injection wells. The study concluded that the effluent injected into the wells would not impact any potable water sources in the area. Exhibit B is an excerpt from the study. vs. USDW.

Regulatory Agencies from the State of Hawaii have established Underground Injection Control (UIC) Lines through out the State. These lines delineate where the potential potable water sources are. In West Maui, the UIC line is located east of the Lahaina Wastewater Reclamation Facility at elevation +180 to +200 msl. At this elevation, the existing effluent injection wells are well downstream of potential potable water sources and therefore not impacting any USDW's. The migration of the groundwater from the mountain to the ocean provides protection for the mountain side water sources. Furthermore, the effluent injection wells are acting as a barrier dam to protect the mountain side water from being infiltrated by ocean water.

salt

UIC dan not delineate USDW.

3. **Part II Page 7 of 19**

C.3(a) The average injection rate shall not exceed the disposal quantity of 6.7 million gallons per day (mgd) for any calendar week.

STATEMENT OF REASONS SUPPORTING REVIEW:

This condition was discussed in Comment No. 18. The region acknowledged in their response that the average injection rate shall not exceed the disposal quantity of 6.7 mgd based on a monthly average and not calendar week.

4. **Part II Page 8 of 19**

D. 1 Injection Well Monitoring Program Samples and measurements shall be representative of the monitored activity. The permittee shall utilize the applicable analytical methods described in Table I of 40 CFR 136.3, or in Appendix III of 40 CFR 261, or in certain circumstances, other methods that have been approved by the EPA Administrator. Reporting shall consist of average, maximum, and minimum daily and monthly values for flow rate, temperature and volume.

Injection rate/flow rate shall be measured in the supply line immediately before the well head.

STATEMENT OF REASONS SUPPORTING REVIEW:

This condition was discussed in Comment No. 34. The region agreed in their response that temperature monitoring was not required and the permit would be revised.

left on ew by accident

5. **Part II Page 9 of 19**

2.(a)(i) Grab samples shall be collected at the sampling valve at the wellhead and used for laboratory analysis of physical and chemical characteristics.

#1

STATEMENT OF REASONS SUPPORTING REVIEW:

This condition was discussed in Comment No. 34. The region agreed in their response that the County of Maui's recommended sample point, effluent distribution box, is approved and would be reflected in the final permit.

6. **Part II Page 9 of 19**

2.(b)(i) Grab samples shall be collected at four monitoring well stations (locations and depths to be determined) and used for laboratory analysis of chemical characteristics.

N/A

STATEMENT OF REASONS SUPPORTING REVIEW:

This condition was discussed in Comment No. 34. The region agreed in their response that the County of Maui's recommended sample point, effluent distribution box, is approved and would be reflected in the final permit.

7. Part II Page 9 of 19

3. Sampling parameter hardness, mg/l as $CaCO_3$

STATEMENT OF REASONS SUPPORTING REVIEW:

This condition was discussed in Comment No. 35. The region agreed in their response that the County of Maui's recommendation of analyzing for Total Hardness in lieu of $CaCO_3$, is approved and would be reflected in the final permit.

scaling

8. Part II Page 11 of 19

9.(a) and (b) Results of the injection fluid analyses specified in permit condition Part II, Section E, Item 4. ~~E~~ D typo

STATEMENT OF REASONS SUPPORTING REVIEW:

The County of Maui believes that the reference to Section E is in error. The reference should be to Section D.

The County of Maui staff is available to address any questions or comments you may have relative to the issues raised in the petition. Please call me at (808) 243-7845 to discuss any issue.

Sincerely,

Charles G. Jencks
Director of Public Works and
Waste Management

EM:ym(WM95201)
c: Linda Crockett Lingle, Mayor
County Council
Senator Daniel Inouye
Dr. Bruce Anderson, Department of Health
Wastewater Reclamation Division

EXHIBIT A

Effluent Fate Study
Lahaina Wastewater Reclamation Facility
Maui, Hawaii

Final Report

February 1994

Prepared for

USEPA Region 9
Hawaii State Department of Health
County of Maui

Prepared by

Tetra Tech, Inc.
3746 Mt. Diablo Blvd., Suite 300
Lafayette, California
94549

TETRA TECH

Executive Summary

Background

A fluorometric survey of an area of the near coastal waters of western Maui, offshore from the Lahaina Wastewater Reclamation Facility (LWRF) was conducted in August 1993 to determine the fate of the effluent from the LWRF. Effluent is currently injected into four wells drilled to maximum depths of 180-255 ft below the ground surface and located approximately 600 m (2,000 ft) inland from the shoreline. The effluent is assumed to discharge into the near coastal waters. This study was prompted by concerns of suspected causal links between nutrients in the effluent and previous algal blooms reported along the west Maui coastline. The study was conducted at the request of Region 9 of the U.S. Environmental Protection Agency (USEPA) in conjunction with the Environmental Planning Office of the Department of Health of the State of Hawaii, and the Wastewater Reclamation Division of the County of Maui. These agencies are investigating possible land-based hydrologic sources that may be contributing excess nutrient loadings into the coastal waters of western Maui.

The primary objectives of this field study were to investigate the fate of wastewater from the LWRF injection wells, to determine the offshore locations of detectable discharges, and to measure the dispersal of the effluent in the offshore waters. A limited number of water samples from the study area were also collected to characterize the nutrient levels in the vicinity of the LWRF.

In order to achieve these objectives, an artificial tracer was added to the effluent as it flowed into one of four injection wells at the LWRF. The tracer chosen was Rhodamine WT, a fluorescent dye that can be continuously sampled and analyzed in the field. This dye does not occur in the natural environment. It can be detected at dilutions of between 10^3 and 10^4 of the input concentration, adsorbs only weakly to sediments, and is chemically stable in the ground water system.

The study design took into consideration the hydrologic characteristics of western Maui and predictions of the transport time, transport paths, mixing, and dilution of the LWRF effluent within the ground water and in the coastal waters. An area of approximately 3,000 m by 3,000 m immediately offshore from the LWRF was investigated. The intent was to locate and map locations of seeps or plumes of dye and effluent entering the coastal waters and to investigate the rates of dilution in the water column. Discrete near-bottom water samples were collected to determine the nutrient characteristics of the effluent after reaching the coastal waters. Water column profile data were also collected.

Field Activities

Field operations commenced on July 1, 1993 with the first addition of fluorescent tracer to the effluent at the LWRF Injection Well No. 2. Slugs of approximately 9.5 L of 20 percent Rhodamine WT were added to the effluent every eight hours for three days. Continuous addition of tracer to Well No. 2 started on July 2, at a rate of 5 mL/min (7.5 L/day), and continued with occasional interruptions until August 28, 1993. Preliminary monitoring, to detect the initial tracer slugs in the near shore waters was conducted on eight days during the period July 3 - 12, 1993.

The main survey effort began on August 21, after 52 days of tracer injection at Well No. 2, and was completed on August 31, 1993. Over sixty hours of continuous fluorometry data were recorded along 36 transects spaced 100 m apart. Near-bottom fluorometry and temperature readings were taken at approximately 450 locations within the study area. Water samples were collected from 30 locations in the study area and at six reference locations outside the area. These samples were analyzed for salinity and eight nutrients. Twenty-two CTD casts were completed, resulting in water column profiles of temperature, salinity and density versus depth.

The final phase of the field effort started on October 10, 1993 and was completed on December 8, 1993. A total of 80 discrete near-bottom water samples were collected from ten locations within the study area approximately once every week for this period. The samples were analyzed in the laboratory for fluorescence in an attempt to detect the tracer should the residence time within the ground water system be greater than 60 days.

Lahaina Wastewater Reclamation Facility Operations

Normal operations were reported at the LWRF during the period of dye injection and field monitoring. Daily flows were recorded from the flow meter installed at the splitter box immediately up-flow from Well No. 2. Total daily effluent volumes passing through the facility were recorded from a flow meter located at the chlorination contact chamber. Effluent volumes injected into Well No. 2 averaged 3.0 million gallons per day (mgd). The total effluent injected into all the wells at the Facility averaged 5.6 mgd during the study period.

Summary of Findings

The major results of the study are summarized below:

The detection limit of the fluorometer was 0.02 ppb under the existing field conditions. For the tracer, Rhodamine WT, to be present but undetectable in the sampled water, dilutions of the tracer and the effluent of at least 3,200 to 5,900 times would be required.

Nutrient analyses showed mostly uniform concentration distributions with some elevated values. However, there was no correlation between nutrients at the locations of the peak fluorescence values, and no correlation between the occasional elevated nutrient concentrations and the spacial distribution of fluorescence could be identified.

Water column profile data showed nearly constant salinity with depth and approximately one degree Celsius temperature variation between the surface and bottom. These data indicated that the water was well mixed and no thermocline or trapping layer was present.

Background fluorescence concentrations varied between 0.04 and 0.06 ppb within the study area and at the reference stations. Concentrations between 0.01 and 0.3 ppb were recorded frequently in near-bottom water during the first half of the survey, but after investigation these readings were attributed to a light backscattering effect, a result of sand and smaller particles passing through the fluorometer. This source of interference was eliminated in the second half of the survey by installing two extra filters in the water intake line. Once the filters were installed, only a few samples with concentrations above 0.10 ppb were recorded.

Concentrations of near-bottom fluorescence generally fell within the range of the background variations, resulting in a data set with a small signal-to-noise ratio. Statistical analyses and contouring of the data identified five possible areas of elevated concentrations. However, at three of the areas the magnitude of the concentrations was close to the sensitivity limit of the fluorometer, and the fourth signal, although stronger, was a single reading of short duration. At the fifth area, in the southeast corner of the study area and approximately 300 m offshore, concentrations of three times background were recorded at two single but adjacent locations on two different days. The location is at the southern boundary of the study area in about 30 m of water. Freshwater seeps and bubbles had been previously reported in this area, but much closer to the shore in very shallow water (less than 2 m). Further investigation would be required in this area to confirm the presence of elevated tracer and effluent concentrations.

The following conclusions can be drawn from the results of the study:

- Elevated concentrations of tracer were recorded at five near-bottom areas within the study area. However, these readings of between 0.02 to 0.12 ppb above the background concentration were either at the limit of sensitivity of the instrumentation or were recorded for very short durations. Consequently, it can not be stated conclusively that the tracer was present at the time of sampling. Further intensive sampling would be required at each of the five locations to verify the presence of elevated effluent concentrations.

- At all other areas within the study area, the tracer was not detected. For the tracer to be present and undetectable, the tracer and the effluent with which it was mixed, must have undergone dilutions of between 3,200 and 5,900 times the injection concentrations. If the tracer was present at detectable levels, it was diluted below detection concentrations before reaching any sampling points, or it was present during times that sampling was not being conducted at that area. If it was present in the near-bottom water, the tracer had been diluted to undetectable concentrations vertically within the first 10 to 30 cm of the bottom, or horizontally within 100 to 200 m of its seabed source.

- The probability of tracer entering the coastal waters within the study area as a single plume is very low. It is more likely that if the tracer was present, it influxes through a large number of discrete points or through one or more wide-area seeps at low flow rates.

- No correlation is evident between the fluorometric survey results and the nutrient analyses or the long-term post-survey fluorescence analyses.

EXHIBIT B

GEOLOGIC/HYDROLOGIC EVALUATION OF THE LAHAINA, MAUI STP WASTE INJECTION SITE

by

Frank L. Peterson

June 29, 1979

they have not been reproduced for this report.

Analysis of the geologic and drillers logs from these exploratory holes has provided two findings of particular significance for this project. First, the injection potential of the strata penetrated by the exploratory wells looks very promising. Although a quantitative evaluation of the rock permeability, and hence injection capacity, could not be obtained from the small-diameter exploratory wells, and must await the pumping/injection testing of the actual injection well, from a purely qualitative standpoint the rock permeability appears to be acceptable. Secondly, the geologic and drilling logs provide a good basis for selecting the various injection well parameters such as well diameter, depth, and casing schedule. This information is discussed in the later section on Injection Well Design.

HYDROLOGIC DATA

Hydrologic data collected from the 2 exploratory wells includes water level information (depth to water and water level fluctuations) and water quality information (salinity and electrical conductivity profiles and chemical analyses).

Analysis of the water level data indicates: (1) the groundwater body in this area is unconfined, (2) the depth to the water table in exploratory well #1, approximately 25 ft from the first proposed injection wells, is 29.5 ft below the top of the well casing (the top of the casing is approximately 1.5 ft above ground surface so the water table is about 28 ft below ground level; the precise elevation of the 2 exploratory wells has not yet been surveyed in and this should be done to establish the position of the groundwater surface with respect to sea level), and (3) short-term fluctuations (probably tidal-induced) of the water table in the 2 exploratory wells appear to be on the order of only 1-2 inches (based on 7 days of continuous water level recording and 12 hours of periodic water level measurements in well #1 and 6 hours of periodic water level measurements in well #2). These findings are significant for 2 reasons. First, the approximately 28 ft depth to the water surface sets an upper limit on the allowable injection head buildup, and secondly, the lack of significant tidal response in these wells indicates that short-term periodic water table fluctuations should not pose a problem at this site. Longer-term seasonal and annual fluctuations also are not anticipated to be significant.

Salinity and electrical conductivity profiles taken from exploratory well #1 are shown in Figures 3a and 3b, and chemical analyses of samples taken from the top of the groundwater body and from a depth of 180 ft in exploratory well #1 are

given in Table 1. The in-situ salinity and conductivity profiles extend only to a depth of 100 ft owing to equipment limitations. The values for the 160 ft depth were taken on a sample collected from that depth and brought to the surface for analysis. It can be seen that the salinity at 100 ft is more than 60% of sea water (salinity of seawater is about 35$^{o}/_{oo}$), and the salinity at 160 ft is about 80% seawater. No samples were collected from well #2 for chemical analysis, however, conductivity and salinity profiles run on well #2 were very similar to those from well #1.

The above-described water quality data are significant for several reasons: (1) they indicate injection will be into brackish and saline waters and should not jeopardize potable water bodies, (2) because the injected effluent, which has a density similar to that of fresh water, will be injected into denser high-salinity groundwater, the effluent can be expected to migrate upward in response to buoyant forces, as well as outward from the well, and (3) the water quality data collected at this time and presented in Figures 3a and 3b and Table 1 will provide pre-injection baseline data for comparison with later post-injection data.

INJECTION WELL DESIGN

Provisions for the construction and testing of the injection well(s) are described in detail in the enclosed Special Provisions for Lahaina Sewer System and Wastewater Reclamation Plant Effluent Disposal Well. The most significant points, especially those that have undergone modification are summarized below:

1. Number of Injection Wells: It is recommended that at least 2 injection wells be constructed. The final injection capacity and injection head build-up will not be known until the first injection well is constructed and tested, and at that time a final decision can be made of the number of wells required. However, even if a single well initially can handle the entire effluent load, a second well should be available at all times on a standby basis to handle any contingencies such as changes in the injection schedule, reductions in injection capacity, system failures, etc.
2. Well Location: The first two injection wells (and this should be all that are required) will be located as originally planned.
3. Well Diameter, Depth, and Casing Schedule: These are all specified in the Special Provisions document, however, the rationale for setting the casing and total well depth is of special significance. The casing depth of 85 ft was selected to allow setting the casing in the very dense impermeable layer which occurs between about 75 to 95 ft depth in exploratory well #1. The total well

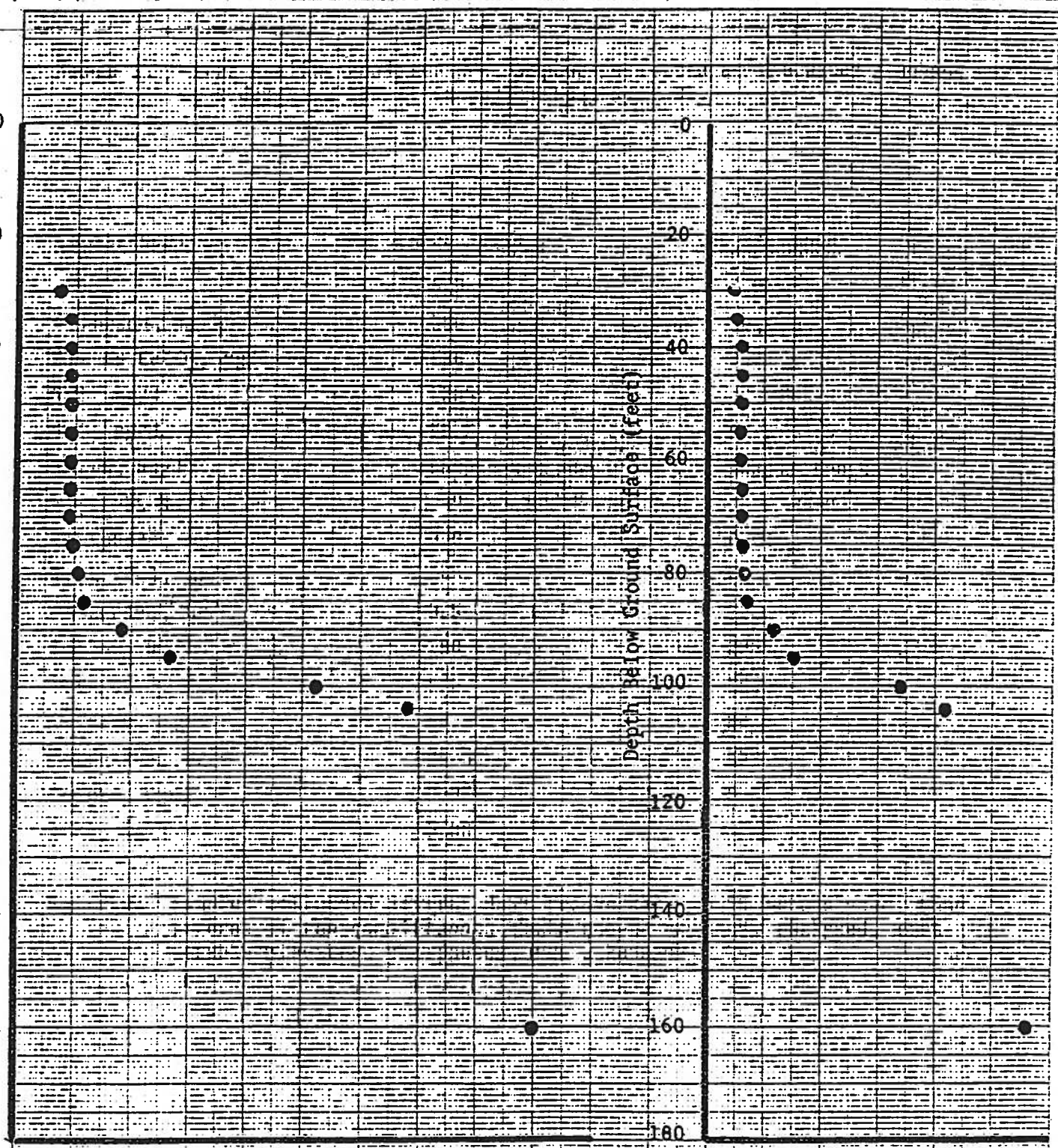

Figure 3a. Conductivity versus depth for exploratory well #1 (average of data collected 6/14/79 and 6/21/79).

Figure 3b. Salinity versus depth for exploratory well #1 (average of data collected 6/14/79 and 6/21/79).

Table 1. Water quality analyses for samples collected at the water surface and at a depth of 180 ft in exploratory well #1.

Constituent	Water surface	180 ft depth
pH	6.9	7.8
Chloride, mg/l	580	26,000
Alk as $CaCO_3$, mg/l	124	100
TDS, mg/l	1298	32,228
TSS, mg/l	59.5	90
NH_3-N, mg/l	sample too old	sample too old
NO_{2+3}-N, mg/l	" " "	" " "
Phosphate, mg/l	0.01	0.01
Iron (Fe), mg/l	---	---
Manganese, mg/l	0.5	1.0
Sodium, mg/l	180	237
Potassium, mg/l	6.6	350
Calcium, mg/l	59.1	83.3
Magnesium, mg/l	46.3	189.3
Copper, mg/l	0.05	0.15
Zinc, mg/l	0.08	0.33

Remarks: Samples collected several days before they could be analyzed, thus several of the constituents could not be reliably analyzed, most notably nitrates, phosphates, and alkalinity